REMARKS

Claims 6-13 and 39-67 are pending in this application. Claims 6-13 are under examination while claims 39-67 are currently withdrawn from consideration. By this amendment claims 6, 10, 11, 12, 39, 44, and 62 have been amended. The claim amendments and additions do not introduce new matter, so they should be entered at this time. The Applicant submits that the changes now place the entire application in condition for allowance.

The Examiner rejected claims 6-13 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,329,207 to Cathey et al. ("CATHEY). Claim 1 recites that the field emission backplate comprises a planar body of thin film comprising an amorphous semiconductor base material, **and** a plurality of emitter sites formed by laser crystallization. In other words, the backplate comprises an amorphous material containing a plurality of crystallized areas or portions. This is in contradistinction to CATHEY where at column 5, lines 60 – 69 teaches that the entire amorphous material is recrystallized. This is clear from the statements in CATHEY that the entire amorphous silicon layer 8 is laser crystallized (see FIG 3D), thereafter patterned (see FIG 3E) and etched (see FIG 3F). Thus CATHEY teaches laser processing (crystallization) of the entire layer, followed by masking, followed by etching. This is a three-step process in which only the final etching step defines emitter tips 13 formed from crystallized material and that are provided upon the recrystallized silicon layer 8.

As noted, the present invention is wholly different from CATHEY in that formation of the emitter sites or tips require only a single or direct step. Referring to page 9, lines 28 onwards of the PCT application as published: "*The deposited thin film then undergoes laser crystallisation by an excimer laser or nd: YAG laser, in this case a KrF laser ..... **This process** results in the surface of the silicon having a rough texture*". Referring also to page 11, lines 29 onwards, "*The laser interference pattern acts upon the silicon layer 16 in creating areas or dots18k,, of crystallization*". Thus, in the present invention there is only a single step of laser crystallizing portions of the amorphous silicon layer. There is no masking step and no etching step as in CATHEY. In the present invention the emitter sites or tips can be further enhanced by selective etching growth (see page 12, lines 12 onwards). For these reasons, the backplate produced according to the present invention is wholly different to that produced in CATHEY. Particularly, in CATHEY the whole silicon amorphous silicon layer is laser crystallized, then masked, and etched to form the tips. In contradistinction in the present invention only portions

of the amorphous silicon layer are laser crystallized so as to form the tips. Thus, in CATHEY the backplate provides a crystallized silicon layer with crystallized tips, whereas in the present invention there is provided a backplate having an amorphous silicon layer with crystallized sites or tips formed thereon.

In summary, CATHEY is using amorphous silicon as a precursor to forming mono crystalline silicon. This is done by using a laser (and would involve dehydrogenation etc. forming a planar surface). CATHEY then uses conventional photolithographic masking to form areas under which one can undercut the silicon using etching to form sharp tips, thereby enhancing filed emission by geometric confinement. In contrast, rather than forming silicon crystal (monocrystal silicon), the inventors use the laser to create extreme surface roughness by using particular energies and leaving the hydrogen in the matrix. The result is a rough surface with features that contain nano-particulates (e.g. crystallites). These confine and enhance the internal electric field. Thus, in the present invention the amorphous layer remains amorphous with crystallized sites, whereas in CATHEY the entire amorphous layer is crystallized.

The Applicant notes the comments in the office action responding to Applicant's explanations filed June 29, 2007. The Office Action states that "*there is no language in claim 6, precluding the method taught by CATHEY, moreover, there is no language in claim 6 that distinguishes the device of CATHEY from that of the Applicant's specification*". It is respectfully submitted that this is incorrect, as it does not reflect a correct reading of claim 6. In contradistinction to CATHEY, claim 6 provides a planar body comprising of an amorphous based material, and the plurality of emitter sites that are crystallized. In an attempt to further clarify and distinguish the present invention from CATHEY, however, claim 6 has been amended to emphasize and highlight these differences. It is clear from claim 6 that in the present invention the amorphous layer remains amorphous with crystallized sites, whereas in CATHEY the entire amorphous layer is crystallized. This significant difference distinguishes the claims from CATHEY, such that the anticipation rejection should be withdrawn. Regarding dependent claims 7-13, it is respectfully submitted that the rejections is rendered moot at least in view of the dependency of these claims on claim 6.

Furthermore, the present structure provides unexpected results. During the manufacture of the structure, the deposition of silicon atoms will only take place on a crystalline substrate and therefore in this case only upon the crystallized dots of the thin film silicon, while amorphous or

weak bonded areas of the structure are simultaneously etched. The continued growth of silicon has the effect of profiling the edges of the growing film where the etching effect is more dramatic. As each crystalline area is typically limited in size to less than 100 nm, the aspect ratio is such that the edges converge. Therefore, each circular dot of 100 nm or less of the emitter plate effectively grows the a profile tip to provide the claimed structure. The growth and etching processes are mediated by mobile hydrogen and the aspect ratio profiling etching leading to sharp tips over the entire growing surface of the plate of thin film silicon. This profiling leads to field enhancement of the emission plate which therefore gives lower thresholds for field emission and thus higher emission currents.

A cross-section of a structure with such grown tips is shown in FIG. 5 of the application. This illustrates a cross-section of spacers which have been formed by allowing the pulsed laser to rest upon certain areas of the thin film silicon to create line or dot crystalline structures that have dimensions much larger than those of the emitter dots. This results in a thicker deposited film being formed upon these crystalline areas. Thus spacers are grown at the time as the emitter tips, allowing placement of gates for terminal devices. As the emission current, and therefore the brightness of the display depends upon the current density, the number of tips, and their sharpness, the multiple tips that are claimed in the present structure unexpectedly provide a sharp electron source that, when incorporated within a device, will provide hot electron injection into the light emitting layer of the device either through an evacuated space or into a wide band-gap light emitting material. This feature of the present structure further supports the patentability of the claims.

In view of the above comments it is respectfully submitted that it is clear that the present invention as defined in the presently pending claims is patentably distinguished over CATHEY and are both novel and non-obvious. The present invention provides a field emission backplate comprising an amorphous semiconductor based material having a plurality of laser crystallized emitter sites formed thereon. CATHEY does not teach, hint or suggest this arrangement, or indeed the method by which this arrangement is formed.

Regarding the withdrawn claims, these have been amended in a similar fashion to claim 6 so as to further clarify and distinguish the present invention over the prior art. Claims 39-43 recite methods for forming the structure of claim 6 and are patentable because they include all of the features of an allowable product claim (i.e., claim 1). Claims 44-61 relate to a field emission

backplate comprising a planar backplate member substantially comprising an amorphous semiconductor based material and a plurality of grown tips substantially comprising a crystalline semiconductor based material formed by laser crystallization on the planar backplate member. Claim 44 is a product-by-process claim of similar scope to claim 1 so that claims 44-61 are allowable and should be rejoined. Claims 62-27 recite methods for forming the structure of claim 44 and are patentable because they include all of the features of an allowable product claim (i.e., claim 44). Accordingly, claims 39-67 should be rejoined and allowed with claims 6-13.

In light of Applicants' amendments and remarks, a Notice of Allowance is respectfully requested. Should the Examiner have any questions or concerns regarding the amendments, remarks or the above-identified application, then a telephonic interview with the undersigned is respectfully requested to discuss any such questions or concerns and to accelerate the allowance of the above-identified application.

Respectfully submitted,

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Allan A. Fanucci (Reg. No. 30,256)

WINSTON & STRAWN LLP
CUSTOMER NO. 28765
(212) 294-3311